

## SCIENCE NEED STATEMENT

### Monitoring of Contaminants-- Chemical Sensor Principles

**Identification No.:** RL-SS37-S

**Date:** September 2001

**Program:** Environmental Restoration

**OPS Office/Site:** Richland Operations Office/Hanford Site

**Operable Unit(s):** Broad need potentially applicable to multiple operable units.

**PBS No.:** RL-SS04 (RL-VZ01)

**Waste Stream:** Groundwater (Disposition Map Designation: ER-10 [technical risk score 5] and ER-18 [technical risk score 5]), Soil (Disposition Map Designations: ER-04 [technical risk score 3], ER-14 [technical risk score 5], ER-03 [technical risk score 3])

**TSD Title:**

**Operable Unit (if applicable):** N/A

**Waste Management Unit (if applicable):** N/A

**Facility:** N/A

#### **Priority Rating:**

This entry addresses the “Accelerated Cleanup: Paths to Closure (ACPC)” Priority: Select a “1”, “2” or “3” to assess the impact of the need/opportunity relative to the current site baseline.

- ☒ 1. Critical to the success of the ACPC
- ☐ 2. Provides substantial benefit to ACPC projects (e.g., moderate to high lifecycle cost savings or risk reduction, increased likelihood of compliance, increased assurance to avoid schedule delays)
- ☐ 3. Provides opportunities for significant, but lower cost savings or risk reduction, and may reduce uncertainty in ACPC project success.

**Need Title:** Monitoring of Contaminants-- Chemical Sensor Principles

**Need/Opportunity Category:** Science Need

**Need Description:** Establish the physics and chemistry principles that underlie more accurate, more sensitive, and higher resolution measurements of contaminant concentrations in the aqueous and solid (surface) phases

Science needs include obtaining a better understanding of the physics and chemistry that will lead more accurate, more sensitive, and higher resolution measurements. Theory from the fields of electronics, electrical engineering, microfluidics, and chemical physics can be examined for their ability to provide innovative measurement technology.

***Schedule Requirements:***

Earliest Date Required: 8/1/99

Latest Date Required: 9/30/15

***Problem Description:*** Monitoring technology performance requires the ability to measure contaminant concentrations in liquids and solids in a timely, safe manner either in-situ or in-line. Currently there are very few highly accurate in-situ or in-line sensors for contaminants of interest. Innovative probes based on fundamental principles are needed to address the gap.

***Benefit to the Project Baseline of Filling Need:*** If the science needs are filled, then it will be possible to make high-speed, accurate, high-resolution analyses of different contaminant species in-situ. These new sensors will reduce risk to human health and provide cost savings.

Benefit code: check all that apply:

- ✓ Cost Savings
- ✓ Risk Reduction
- ✓ Enabling Knowledge (i.e., solves a problem that cannot be remediated by current science/technology)

This Science Need also supports the following Hanford Subsurface Contaminant Technology Needs:

***RL- SS31***

Understand and quantify the relationship between contaminant sources, vadose zone plume properties and groundwater plume properties with a focus on the groundwater-vadose zone interface.

***Relevant PBS Milestone:*** PBS-MC-042

***End-User:*** Richland Environmental Restoration Project

***Site Technical Point-of-Contact:*** Scott W. Petersen, BHI, (509) 372-9126; Mark D. Freshley, PNNL, (509) 372-9568; Michael J. Truex, PNNL, (509) 376-5461

***Contractor Facility/Project Manager:*** Michael J. Graham, BHI, (509) 372-9179

***DOE End-User/Representative Point-of-Contact:*** John G. Morse, DOE-RL, (509) 376-0057